



## Scotland's Coastal Heritage at Risk Project Newshot Island boat graveyard

July 2017

Data Structure Report



Recording the mud punts. Photo by Eddie Martin.



<i>Period of fieldwork</i>	4 <sup>th</sup> -5 <sup>th</sup> October 2014; 18 <sup>th</sup> -19 <sup>th</sup> February 2017; 18 <sup>th</sup> June 2017
<i>Local Authority</i>	Renfrewshire
<i>Parish</i>	Inchinnan
<i>NGR</i>	NS 47808 70534

The project was run and supervised by Tom Dawson, Joanna Hambly and Ellie Graham of the SCAPE Trust as part of the Scotland's Coastal Heritage at Risk Project (SCHARP) in partnership with the Nautical Archaeology Society (NAS). Training was provided by Steve Liscoe of the NAS, and by Joanna and Ellie of SCAPE. Drone aerial photography was carried out and a photomosaic created by Eddie Martin. Site recording was undertaken by volunteers from the local community. Ian Sinclair did initial archival research and further research was carried out by Catherine Abbott and Aisling Gallagher of Tern TV.

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## Contents

Abstract.....	1
Background to the project .....	2
Project aims and objectives .....	2
Project organisation and participation .....	2
Site location and remains .....	5
Methodology.....	5
Preparation .....	5
On-site survey and recording.....	5
Post-excavation and historical research .....	9
The Clyde Navigation .....	9
Vessels used in the creation and maintenance of the Navigation.....	9
The schooners .....	11
The Kingston Dock Fire.....	13
The dredging fleet: results and discussion.....	15
Mud punts.....	15
Diving Bell Barge .....	19
The schooners: results and discussion.....	23
Publication .....	38
Bibliography .....	39

## Abstract

As part of the Scotland's Coastal Heritage at Risk Project (SCHARP), a survey was carried out of a boat graveyard at Newshot Island in partnership with the Nautical Archaeology Society (NAS).

Two seasons of fieldwork were undertaken, one focused on the vessels associated with the deepening and maintenance of the Clyde Navigation, and one on a group of schooners deliberately dumped at this site.

Site recording included a total station survey, a drone aerial survey and the creation of detailed written, photographic and drawn records of selected vessels in the boat graveyard. Historical research was undertaken to understand the remains and place them in context.

The project created a record of the vessels and their condition for future monitoring and identified the vessels as the remains of some of the Clyde Navigation Trust's dredging plant and a group of fire-damaged schooners which were deliberately dumped on this site.

The project has been presented at conferences and disseminated online through SCHARP networks, and in due course will be submitted for publication to the International Journal of Nautical Archaeology. It will be featured in an episode of Channel 4's *Britain at Low Tide* on the intertidal heritage of the Clyde, due to air in late 2017.

## Background to the project

Potential collaborative survey projects were discussed by SCAPE and the NAS at an early stage of SCHARP, and Newshot Island was identified as a suitable site for a joint ShoreDIG and NAS project. The local library put SCAPE in touch with Ian Sinclair, who had undertaken research into the site and the history of the vessels. The Canmore entry for the site recorded the remains of mud punts which had been used in dredging the River Clyde and three other craft, thought to have been abandoned there after a wartime bombing raid.

A project to record the remains in detail was developed and three seasons of fieldwork were undertaken, in October 2014, February 2017 and June 2017.

## Project aims and objectives

- Create a detailed and comprehensive record of the vessels before they deteriorate further;
- Create a record of the vessels' condition which can be used as a basis for future condition monitoring;
- Research the history of the vessels which comprise the boat graveyard;
- Provide an opportunity for learning and involvement for the local community, SCHARP volunteers, and NAS members;
- Share the results with the West of Scotland Archaeological Service HER and Canmore;
- Publicise the results of the project through the SCHARP networks.

## Project organisation and participation

Planning and organisation were undertaken by SCAPE and the NAS. Thirty-five local volunteers were involved in undertaking the fieldwork. Training in the principles of recording and site survey was delivered at the start of the fieldwork and the partnership with the NAS allowed volunteers the opportunity to gain an accredited qualification. Thanks to support from Historic Environment Scotland, fifteen volunteers completed the Introduction to Nautical Archaeology course. Eight volunteers also received training in illustration software and digitised the drawings of the vessels. Staff from Museum of London Archaeology visited Scotland and participated to inform the development of the Coastal and Intertidal Zone Archaeological Network project (CITiZAN) which is based on SCHARP.

SCAPE staff presented the results of the work at the SCHARP project conference in June 2016, and to an international audience at the joint SCAPE and NAS conference in November 2016. It will feature in an episode of the second series of Channel 4's *Britain at Low Tide*.





Figure 1: Location map. 1:250 000 Scale Colour Raster [TIFF geospatial data], Scale 1:250000, Tiles: ns, Updated: 11 May 2015, Ordnance Survey (GB), Using: EDINA Digimap Ordnance Survey Service, <<http://digimap.edina.ac.uk>>, Downloaded: 2017-06-09 09:37:06.778



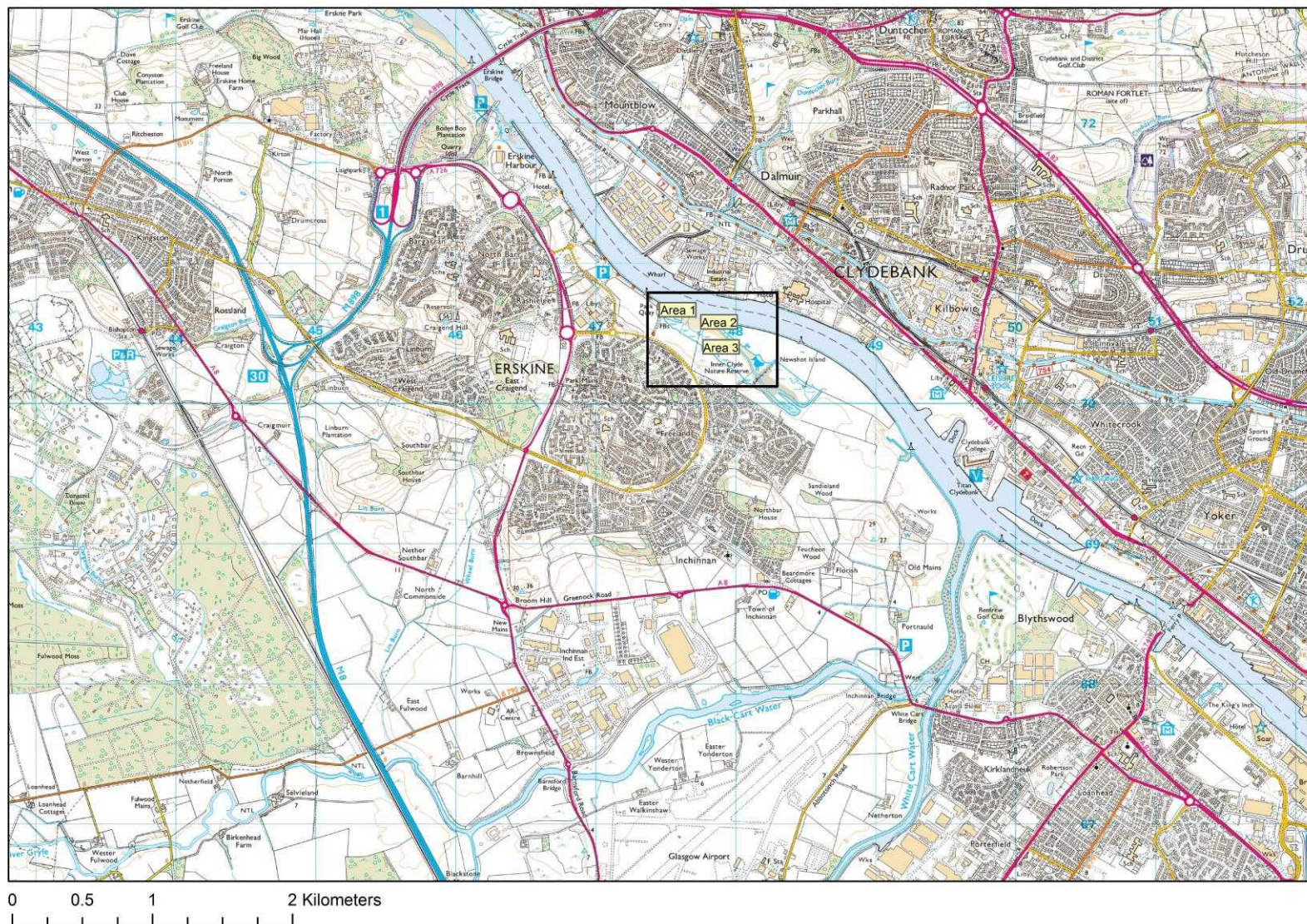


Figure 2: Site map. 1:25 000 Scale Colour Raster [TIFF geospatial data], Scale 1:25000, Tiles: ns37,ns46,ns47,ns56,ns57,ns35,ns36,ns45,ns55,ns65,ns66,ns67, Updated: 16 February 2017, Ordnance Survey (GB), Using: EDINA Digimap Ordnance Survey Service, <<http://digimap.edina.ac.uk>>, Downloaded: 2017-06-09 09:15:43.02



## Site location and remains

The site comprises a group of at least 53 vessels in an area of intertidal sand, silt and mud at Newshot Island Nature Reserve around 300m north of Inchinnan centred on NS 47808 70534 (Figure 1). They cover a c.600m length of foreshore on the south bank of the River Clyde and along the relict channel which formed Newshot Island.

The vessels are in the intertidal zone and are partially buried in riverine sediment; salt marsh is developing around those to the east. Forty-eight are rectangular flat-bottomed wooden punts, four boats are wooden schooners, with hulls upstanding to varying heights. There is one metal barge. The remains of further vessels may be located in the area, either obscured by accreted sediment or too broken up to be clearly recognisable.

The vessels form three main groups. Area 1, furthest west, is adjacent to Park Quay and includes the remains of seven punts. Area 2, c.300m to the east is centred on the mouth of the Newshot Creek, which originally divided Newshot Island from the south bank of the Clyde, and comprises ten further punts and four wooden sailing boats, one of which, in the middle of the creek, is permanently submerged. Area 3 lies c.200m to the south east of Area 2, on the south bank of Newshot Creek and consists of 28 wooden punts and the metal barge. Three further punts lie between Areas 2 and 3.

## Methodology

### Preparation

Steve Liscoe visited the site to scope its suitability for an NAS training event, and shared the report with SCAPE, who undertook an initial site visit in June 2014.

Permanent survey markers were placed on the site and their location recorded with a Leica TC407 total station theodolite. The seven punts in Area 1 and the three accessible boats in Area 2 were located relative to these markers, and nails affixed to the remains to allow more detailed records to be related to this survey.

In September 2014 Eddie Martin carried out a drone survey of the site, and created two geo-rectified, highly detailed photomosaics of the boat graveyard (Figures 3-7, also available online at <http://www.gigapan.com/gigapans/162364>).

### On-site survey and recording

The detailed survey was carried out with local volunteers over three fieldwork campaigns in October 2014, February 2017 and June 2017. The 2014 work was focused on Area 1 and recorded four mud punts, the 2017 surveys recorded three schooners in Area 2 and the diving bell barge in Area 3.

The methodology comprised three basic elements; completion of a pro-forma wreck recording form, photographic recording and scale drawing. A hulk recording form was developed from the NAS and CITIZAN pro-formas. Volunteers carried out the on-site recording under guidance from SCAPE staff and NAS tutors. The photographic record for each vessel included both general views of the remains and details, and a photo board was used for identification. General shots showing the overall site and working shots were also taken. Selected vessels were also drawn at a scale of 1:20 using a baseline and offsets with planning frames used for details where appropriate. Drawings included the nails which had been surveyed relative to the control points. Where present and appropriate, upstanding elements were drawn as elevations, and some profiles were drawn. The metal barge was recorded by comprehensive ground and pole photography to give 360 degree views.

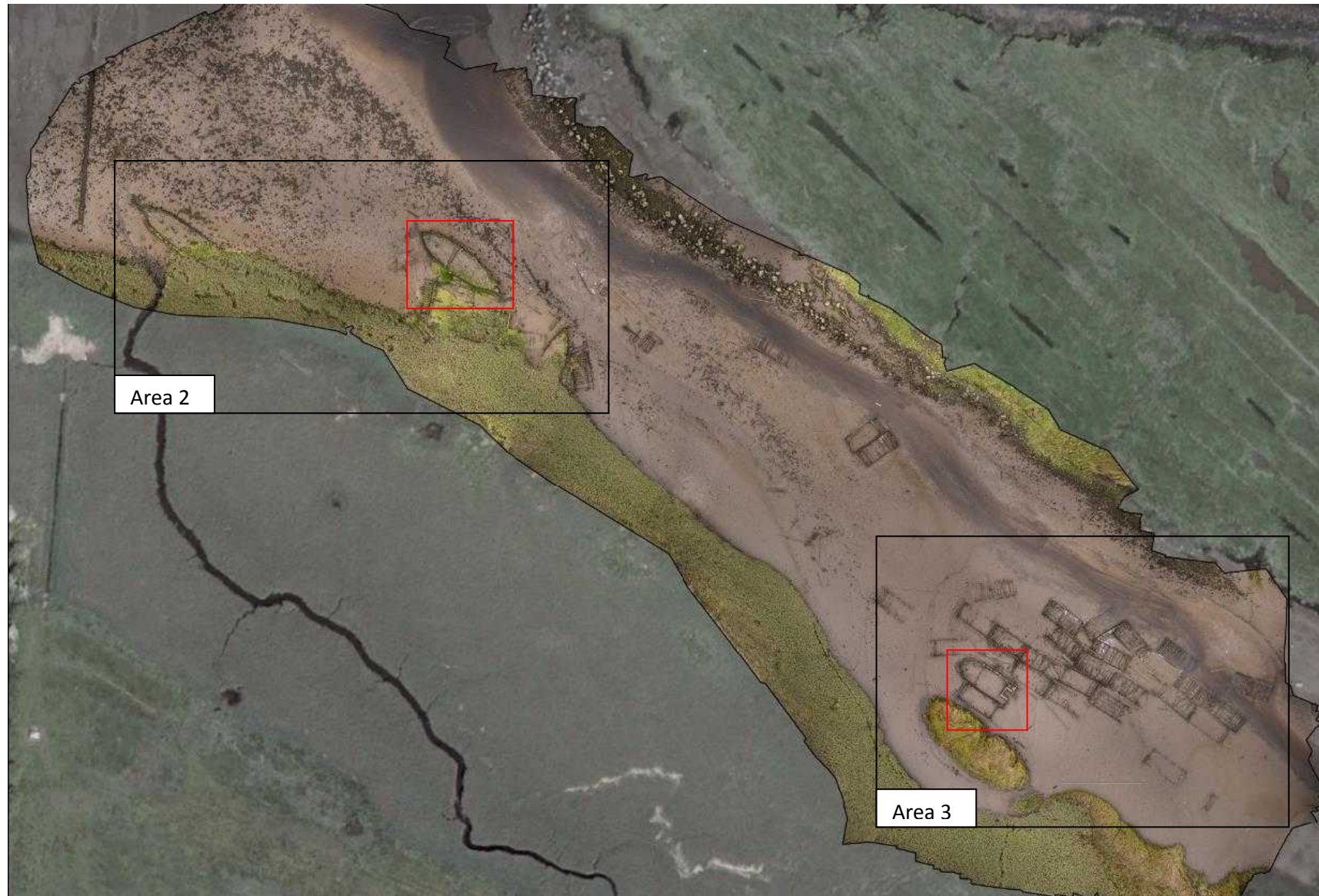


*Figure 3: Georeferenced photomosaic of Area 1 generated from aerial photography. Created by Eddie Martin*



*Figure 4: Detail of punt 5 in Area 1*





*Figure 5: Georeferenced photomosaic of Areas 2 and 3 generated from aerial photography. Created by Eddie Martin*





*Figure 6: Detail of schooner 9 in Area 2*



*Figure 7: Detail of metal vessel identified through historic research as a diving bell barge in Area 3*

## Post-excavation and historical research

The records, drawings and photos for each vessel were checked and digitised. Volunteers digitised the drawings in the free illustration package Inkscape.

Historical research was undertaken; reports from contemporary newspapers and online aerial photography collections were consulted and the archives of the Clyde Navigation Trust, held at the Glasgow City Archives in the Mitchell Library were examined. As well as detailed documentary records about the Trust's dredging plant, these also contain an extensive photographic collection. The Trust's specifications for the two Diving Bell Barges, the tender documents from the successful yards for both contracts and the plans and blueprints for the 1852 Diving Bell Barge were examined and compared with the remains of the metal vessel on site.

## The Clyde Navigation

The natural channel of the River Clyde was very shallow, with depths of as little as 2 feet at low tide on some stretches (Riddell 1979, 23), as attested by a putative ford of Roman date (Canmore ID 43350) which crossed the river at Dumbuck. To meet the developing needs of Glasgow, and the demands of the powerful merchants engaged in the tobacco trade, a series of attempts were made to deepen the channel from the mid-18<sup>th</sup> century, both to improve the navigability of the River Clyde to facilitate shipping and to reduce the flood risk it posed. Initial work by engineer John Golborne focused on narrowing the channel to speed the flow of the water and harness its natural scouring action in order to deepen the riverbed through erosion. Lateral jetties projecting into the channel were constructed, joined in 1773 by a training wall, the Lang Dyke, to narrow the river and increase its flow (*ibid.*, 43). The programme of improvement, which fell within the remit of the River Improvement Trust, not only deepened the river, but straightened it along this stretch between Longhaugh Point and Dumbarton. Despite this success, there was constant demand for further improvement to meet the growing needs of ever-larger ships and increasing international trade from the city. Furthermore, while the erosive action of the water achieved significant deepening along much of the channel, it had limited impact on harder rocky areas which by the 1820s had become the main constraint to the depth of the Clyde.

## Vessels used in the creation and maintenance of the Navigation

Steam dredgers were first used on the river in 1824, (*ibid.*, 84) both to excavate the riverbed further and to maintain the depth already achieved by removing silt deposited by the river. They worked in partnership with wooden barges, each with a capacity of 10 tons, which were tethered to the sterns of the dredgers, collected the excavated spoil, and transported it to the riverbank where it was used to reclaim land. This reclamation both further narrowed the channel and created new land for riverside development. Although originally moved by punting, from which the term 'mud punts' was coined, by the 1830s the vessels were moved by steam tugs from the dredger to the dumping grounds. When being moved, they were lashed together in a raft formation of 10-12 vessels, (*ibid.*, 275-283).

Although this combination of training walls and dredging significantly improved the navigation of the river; the increasing size of ships, expanding industries and the growing demands from Glasgow to develop its foreign trade generated a constant need for further deepening. The success of the dredgers at removing softer riverbed sediments also exposed large boulders and areas of rock on the riverbed, which dredging couldn't remove. In reports of 1827 and 1831 a diving bell was recommended by the engineer Robert Stevenson to deepen more difficult stretches of the riverbed (*ibid.*, 275). A diving bell and operating mechanism were ordered in 1833 and were initially retrofitted to a wooden punt, with a custom-built support vessel ordered in 1852 and built by Clyde



shipbuilders A & J Inglis & Co. (figure 8). Its success was such that a second diving bell with lifting gear and a support barge were ordered by the Clyde Navigation Trust (which had superseded the River Improvement Trust in 1858) and built to very similar specifications in 1861 by the London Works, Renfrew (figure 9).

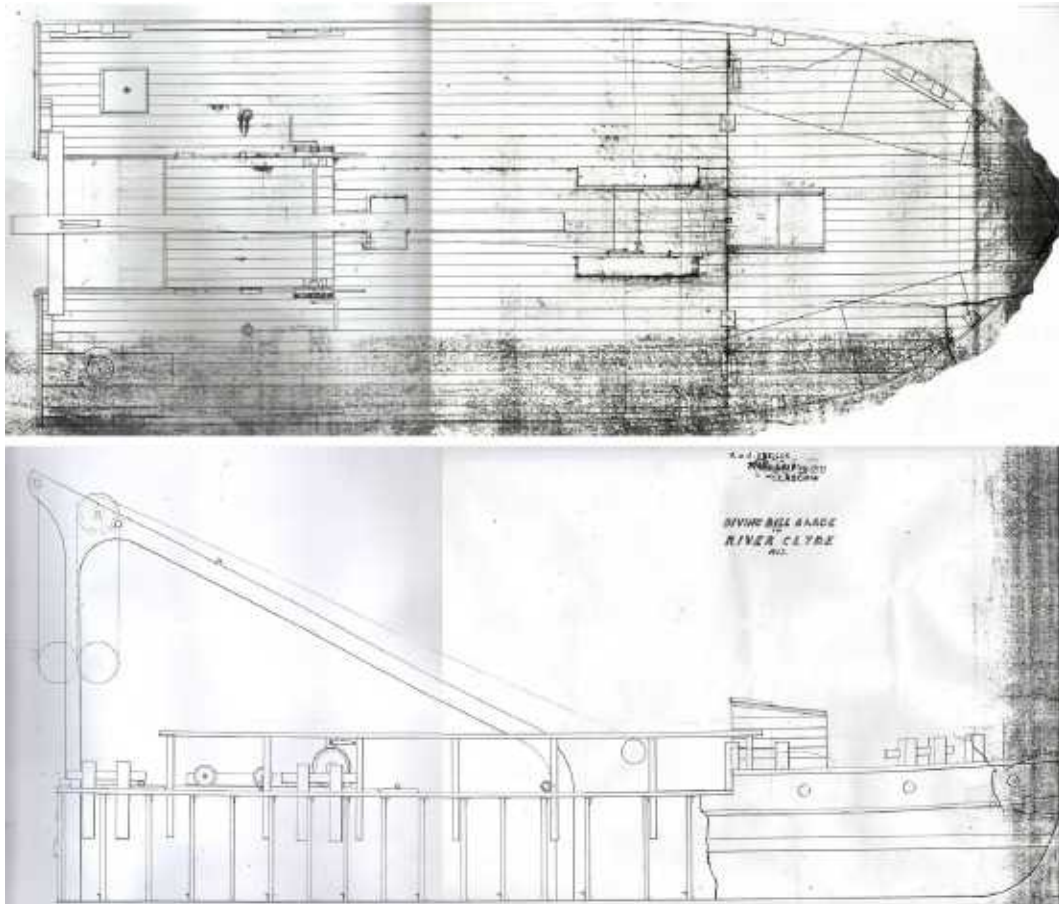


Figure 8: Plan and elevation drawings for Diving Bell Barge by A & J Inglis 1852. From the archives of the Clyde Navigation Trust, held at Glasgow City Archives, the Mitchell Library.

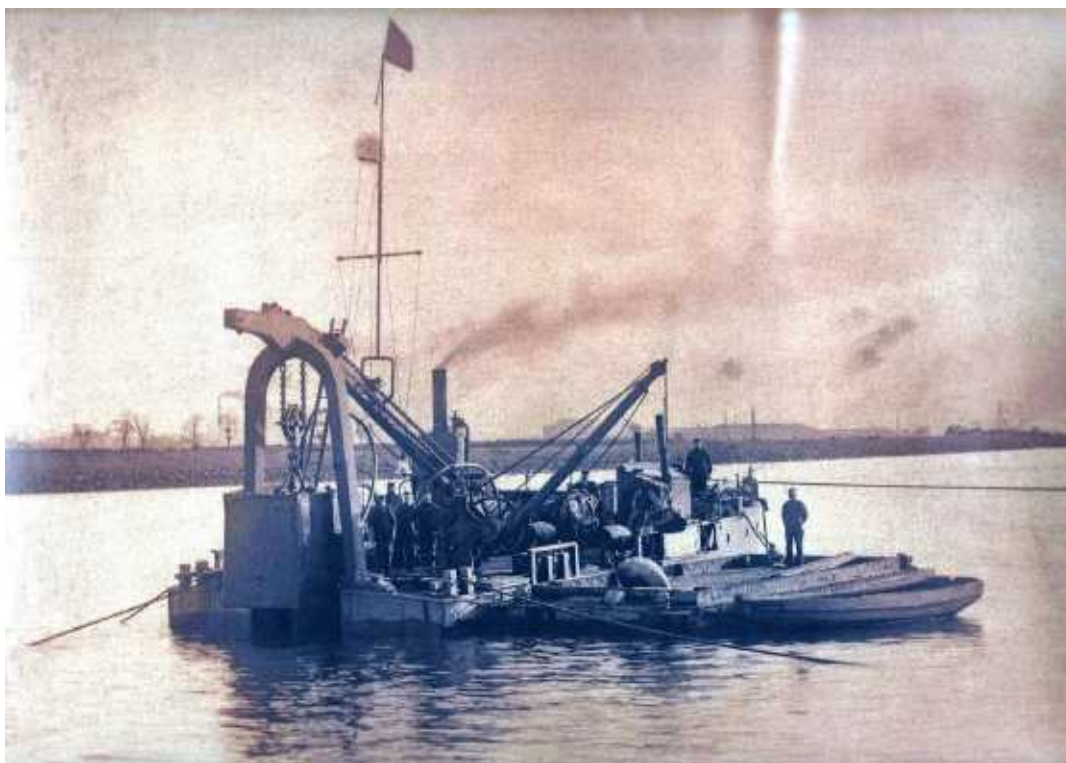


Figure 9: Photo of the second Diving Bell Barge (built 1861) working on the Clyde, with a mud punt tethered alongside. From the archives of the Clyde Navigation Trust, held at Glasgow City Archives, the Mitchell Library.

Excavated material from the riverbed illustrated the hazards presented by the naturally shallow channel presented to shipping when deepening works around Newshot Island in the 1840s recovered scraps of copper and iron ripped from ships' hulls by the rocks (*ibid.*, 123). Although the combination of dredgers and diving was extremely successful at deepening the river, a bank of volcanic rock discovered in 1854 required the explosives, used alongside the dredgers and diving bell which removed the debris (*ibid.*, 152). As the volume of spoil increased, disposal became increasingly problematic. Land was rented at Newshot Island for the dumping of the dredged material in the 1860s, but by 1862, spoil was being dumped at sea by self-propelled hopper barges, leading to a decline in the use of punts for disposal.

By the middle of the 19<sup>th</sup> century, the improvement of the navigation of the Clyde was described as "one of the most successful engineering operations achieved in Great Britain" (Bald 1845, 234), thanks to the dredging plant of the Clyde Navigation Trust, which had a dedicated repair and maintenance yard at Dalmuir, opposite Newshot. This fleet, consisting of dredgers, punts, tugs and the diving bell barges was by the early 20<sup>th</sup> century collectively called "the largest and most powerful in Britain" (Riddell 1979, 305), while in order to supply the needs of the dredging plant, Clyde yards had a "virtual monopoly of the dredger market not only in Britain but throughout the world" (*ibid.*, 309). As technology developed, the dredging plant became larger and more advanced, but the early technology remained in use; the first diving bell barge was not broken up until 1933 (*ibid.*, 276).

### The schooners

Schooners were sailing boats defined by their rigging and sail plans which developed from c.1600 and grew in importance in British merchant shipping in the 19<sup>th</sup> century, mirroring the significant role that schooners played in North American commerce (Greenhill 1968). They were particularly important for the fruit trade in the first half of the 19<sup>th</sup> century, importing to Britain from the Mediterranean, the Azores and the West Indies (MacGregor 1997, 88), as well as working the packet trade around British waters and carrying goods and passengers from Scotland to London. However,



with the introduction of steam power, wooden sailing boats declined from the middle of the 19<sup>th</sup> century onwards. Schooners remained in service well into the 20<sup>th</sup> century, but were increasingly concentrated on the home trade and worked as coasters. The First World War acted as a catalyst for change, and diesel engines became more widespread with only a few schooners continuing in service up to the Second World War (Greenhill 1968, 39-48).

Three of the four wooden ships at Newshot Island were recorded in the National Monuments Record as schooners, and the entry stated that they had been abandoned there following a “wartime bombing” raid. The Clydebank Blitz of March 1941 caused extensive damage to the Glasgow riverfront, and aerial reconnaissance photos taken by the Luftwaffe in 1939 show targets identified around Newshot Island. However, historical aerial photographs held by HES and available through the National Collection of Aerial Photographs showed the vessels on site here in 1937, prior to the outbreak of the war (figure 10). Second World War bombing therefore cannot account for their dumping at Newshot; and Glasgow was not targeted by Zeppelin raids in the First World War. However, four schooners are recorded as having been destroyed by a major fire at Kingston Dock in June 1914.

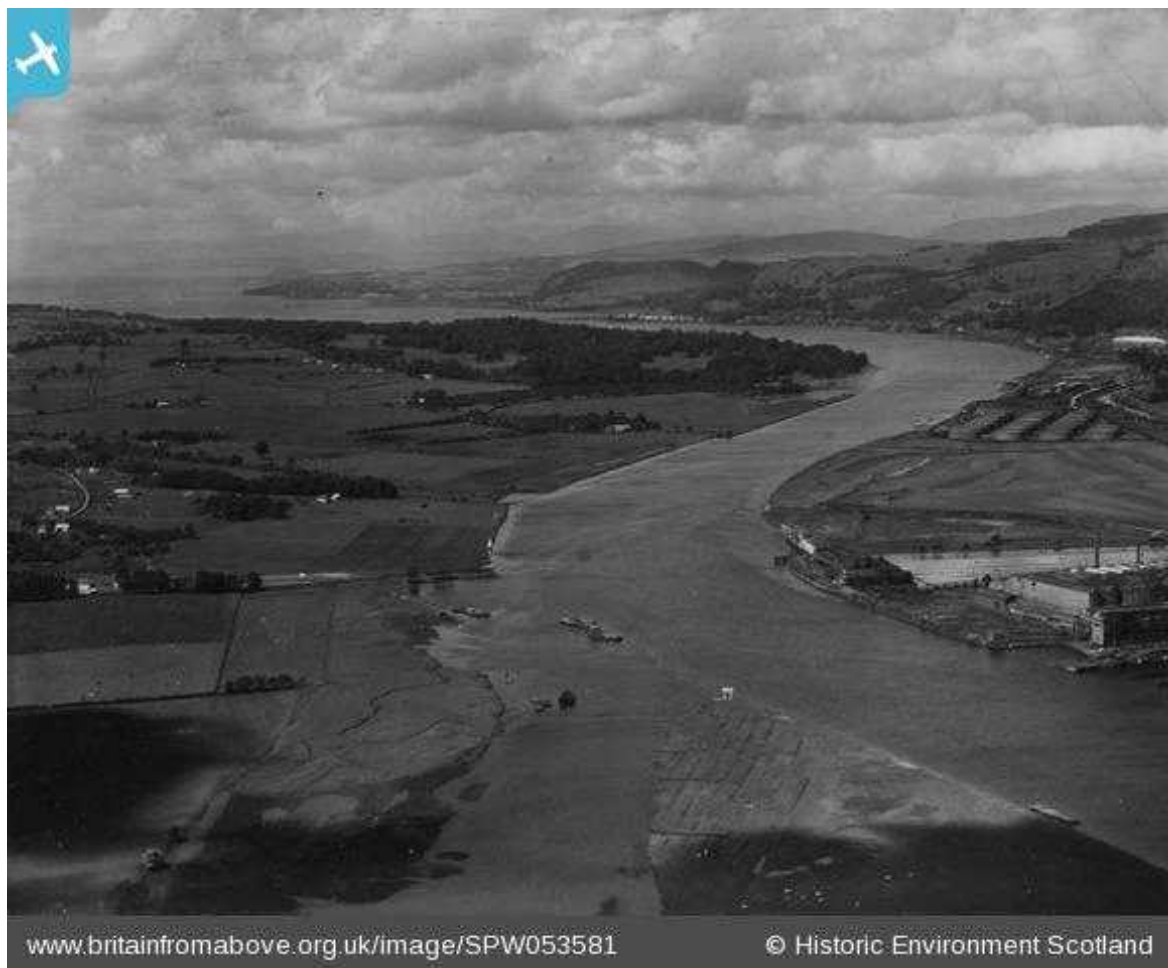


Figure 10: 1937 aerial view showing schooners already at Newshot Island. Note mud punts moored at square stone mooring blocks in the intertidal zone – the blocks are still visible. Britain from Above / Historic Environment Scotland.

### The Kingston Dock Fire

Alongside the improvement of the river channel, the 19<sup>th</sup> century saw massive development of docks and wharfage along the length of the river banks. The site of Windmillcroft, on the south side of the river and to the east of Glasgow was developed in the 1860s, with the excavation of a tidal basin and construction of quays. Officially opened in 1867 as Windmillcroft Basin, it became generally known as Kingston Dock (Riddell 1979, 192-8).

Although it initially accommodated the largest foreign trading vessels on the Clyde, by the early years of the 20<sup>th</sup> century, its depth was unsuitable for the larger ships then in use, and it was used only by the coastal trade. In 1913, work was started to improve the facilities by widening and deepening the dock. However, in June 1914, a catastrophic fire was started by workmen using a red hot iron to bore a hole in creosoted timber.

The incident was reported in international newspapers which contained various levels of detail, including that four schooners were destroyed in the fire. Many of the reports list the burned vessels:

- The *Warsash*, from Dumfries
- The *Navigator*, from Portsmouth
- The *Volant*, from Wick
- The *Dashwood*, from Penzance

A fifth vessel, the *Edith* (a Cornish ship) was named in a single report (Shields Daily News 19<sup>th</sup> June 1914) as having been destroyed. Ian Whittaker's research (1998) corroborates the destruction of the *Warsash* and the *Navigator*, and adds the *Edith* and *J.T.S.* (from Barrow, Cumbria) as casualties of the fire, but does not list the *Volant* or the *Dashwood*.

Examination of shipping registers for the home ports of the vessels clarified the conflicting reports. The *Warsash* is listed in the Dumfries Port records as having been destroyed by fire in Glasgow on 18<sup>th</sup> June 1914. The Portsmouth records for the *Navigator* also confirm destruction by fire in 1914. The register entry for *J.T.S.* was closed on 6<sup>th</sup> July 1914, citing destruction by fire at Kingston Dock. The *Edith* is also recorded as having been destroyed in fire (though this is erroneously listed as Princes Dock [http://www.cotswoldcanalsheritage.org.uk/page\\_id\\_132.aspx](http://www.cotswoldcanalsheritage.org.uk/page_id_132.aspx)) prior to the First World War.

However, the other vessels, the *Volant* and the *Dashwood* appear to have remained active after the date of the Kingston Dock fire. The *Volant* was sold to an Irish owner in 1916, and the registry wasn't closed until 1956; a vessel of this name was also recorded as being windbound at Holyhead in 1934 while bound for Ireland (Greenhill 1968, 202). Records for the *Dashwood* state that she was owned by a Mr Tregaskis of Penzance and remained active until she was wrecked in 1918.

The historical records appear to indicate that the contemporary news reports were incorrect in the names of two of the vessels which were destroyed in the fire, and that the four schooners which were destroyed were *Warsash*, *Navigator*, *Edith* and *J.T.S.*.

The vessels, described as having been "burnt to the water's edge" (Western Mail 19<sup>th</sup> June 1914) (figure 11) then appear to have been taken to Newshot Island and deliberately abandoned here, at the mouth of the creek where they did not form an obstruction to the shipping on the river.



*Figure 11: Kingston Dock after the fire, with a burnt-out schooner in the foreground. Clyde Navigation Trust archives, Glasgow City Council ref. T-CN 19/12/293.*

## The dredging fleet: results and discussion

### Mud punts

Of the c.48 mud punts identified at Newshot Island, four of the most accessible and most representative in Area 1 were recorded in detail. Despite varying levels of preservation, they are of very similar construction, and rapid survey of the punts in Areas 2 and 3 suggest that these also conform to a very similar design. These punts are illustrated by the example of boat 5 in figures 4, 12-15, and the survey record for boat 5:

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Vessel ID	5			
Dimensions (m): Length:	9.5	Breadth:	4.5	Height: 1.1

Vessel type: Barge

Propulsion: Towed

Visible elements: Bottom planking, frames, external planking, deck planking, stanchions, crossbeams, mooring / towing bollards, knees.

Frame spacing (centre to centre): 0.55

Fastenings: Iron

Toolmarks: None visible

#### Description:

Rectangular, straight-sided, wooden flat-bottomed barge, with iron fastenings. Wooden deck planking supported by iron knees and a grid of timber stanchions. Metal bollards at each corner for towing and tethering.

Surveyor name: Mel & Sue Bush

Date of survey: 05/10/2014

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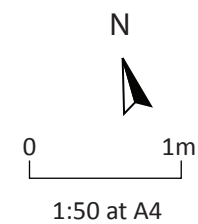
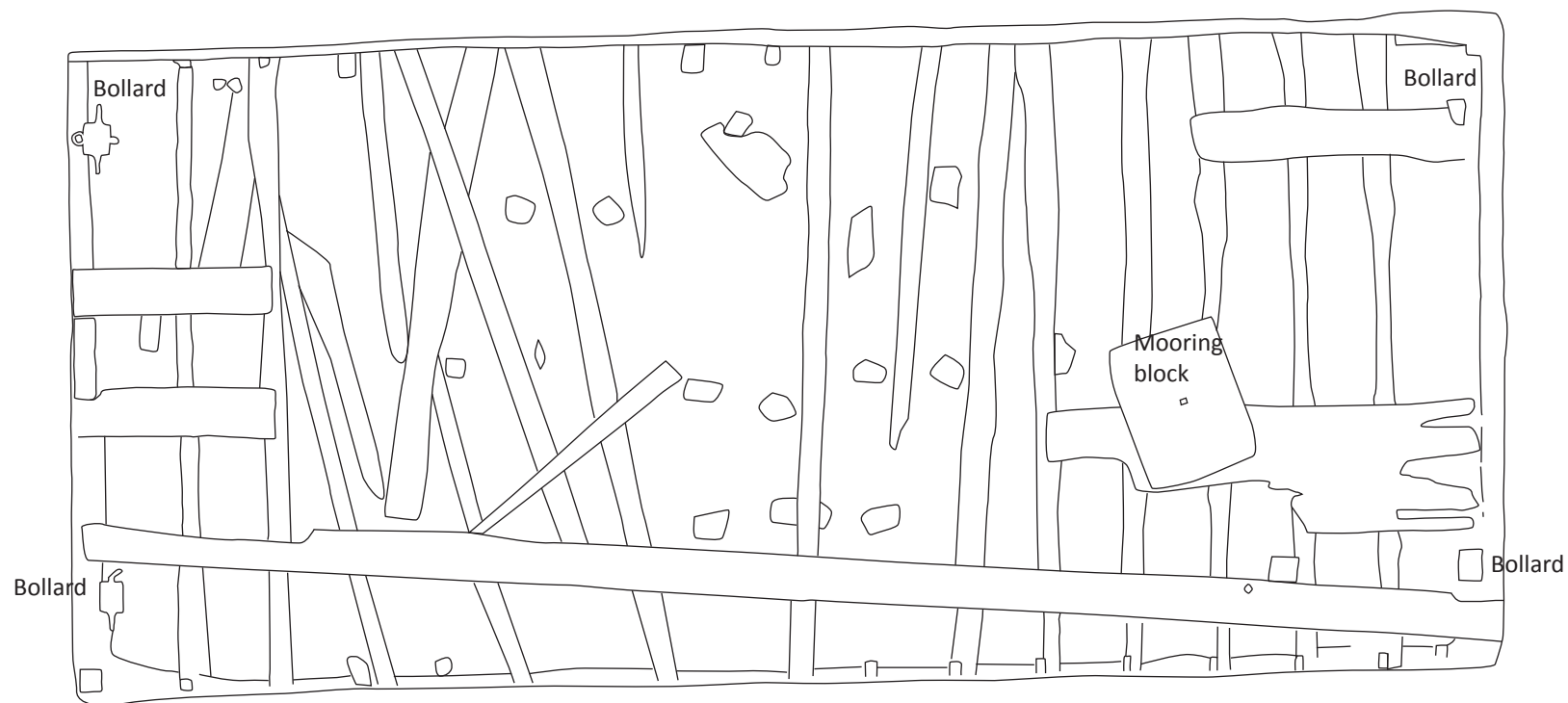


Figure 12: Mud Punt boat 5. Drawn by Irene Dayer, Gillian Dawson, Carla Rennie, Colin Young, Mel & Sue Bush, 4-5th October 2014.



*Figure 13: Punt 5 facing east. Long plank on right side is remains of deck level.*



*Figure 14: Punt 5 facing west, showing bollards in corner.*



These are simple rectangular flat-bottomed wooden dumb barges, around 10m in length and 4.5m wide, designed to be simple but robust floating platforms for the removal of excavated spoil from the dredging and diving operations. Each punt had a carrying capacity of 10 tons (8 cubic yards / 6 cubic metres). The sturdy wooden construction also includes iron fastenings, knees and straps and reinforcements at the corners. Distinctive features include four metal bollards at the corners which were used for mooring, towing and tethering the punts into a raft formation.

One of the punts in Area 2 contained a bundle of reeds which appears to have been used as a fender, presumably during towing in rafts to prevent punts damaging each other. The punts in all three areas are closely grouped together, suggesting that they may originally have been deposited on the foreshore here still in raft formation.



*Figure 15: Reed fender in punt adjacent to schooner 9.*

### Diving Bell Barge

The diving bell barge is the only metal vessel on site, and was recorded by comprehensive aerial and ground photographic survey (figures 7, 16-18).

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Vessel ID	30		
Visible dimensions (m): Length:	15.24	Breadth: 6	Height: 2.5
Vessel type:	DIVING BELL BARGE		
Propulsion:	TOWED		
Construction:	Riveted metal plating		
Description:	<p>An iron barge, with spoon bow, and flat ended stern with square cut-out in middle of stern. Lower part buried in foreshore sediment and interior filled with silt, main body of hull stands above current beach level by c.075m, likely to original deck height. Hull formed of iron plates densely riveted together, now corroded through in several places. Iron stem post, iron frames and iron hanging knees visible on interior of hull plating. Occasional timber elements including wooden frames, attached by square-section iron bolts, and wooden wales / fenders running the length of the outside of the hull. Small circular portholes in hull towards stern. A metal cylinder c.1.5m high stands on starboard side of the cutout at the stern. No deck structures survive other than this cylinder and two metal bollards which are attached to the remains of the deck on the starboard side. A wooden punt lies alongside on the port side, possibly originally tethered to the vessel. A metal box measuring 1.27m by 1.98m lying adjacent to the vessel on the starboard side has been badly corroded, leaving only the edges where plates overlapped and were reinforced by rivets.</p>		
Surveyor name:	Tanya Freke & Ellie Graham		
Date of survey:	18/02/2015		

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Figure 16: Diving Bell Barge facing south.





Figure 17: Diving Bell Barge, starboard side, showing upturned remains of diving bell next to hull, and the mooring bollards.



Figure 18: Detail of cutout at stern of Diving Bell Barge for housing diving bell.

This boat is of particular interest both as it is the earliest known diving support vessel to survive and because the extensive information contained in the archives of the Clyde Navigation Trust has allowed its history to be examined in detail.

The Trust's first diving bell barge, put out to tender in 1852, was built as a support vessel for the pre-existing bell, built in 1833, which up to this point had been operated from a mud punt; whereas the second barge, nine years later, included a bell and operating mechanism.

The Trust's specification documents were very precise in the requirements for the barges and the bell, and the detail they and the tenders contain show that there was very little difference between the earlier and later vessels, other than a slight increase in size from a 50 ft length to 56 ft, and from 20ft breadth at stern to 23 ft. These minor differences in size allowed comparison between the two sets of specifications and the vessel on site. Measurements of 6m (20 ft) breadth at the stern of the metal barge confirm its identity as the earlier of the two diving bell barges, dating it to 1852.

The metal box which lies almost completely buried adjacent to the starboard side of the barge measures 1.98m (6 ft 6 in) by 1.27m (4 ft 2 in), and appears to taper slightly. These dimensions match the specifications for the first diving bell (6ft by 4 ft 2 in and 6 ft 6 in high) (Riddell 1979, 275) which are significantly smaller than the specifications for the later bell ordered in 1861 (6 ft 6 in by 6 ft at the mouth, tapering to 6 ft by 5ft 6 in at the top, and 6 ft 6 in high). Identification of this box as the remains of the associated diving bell would substantiate the identification of the vessel as the earlier of the Trust's two diving bell barges. This barge is recorded as having been broken up in 1933 (*ibid.*, 276); though given the survival of the hulk, this presumably constituted the abandonment of the hull after useful elements had been salvaged.

The similarity in the specifications for the two vessels suggests that the first diving bell was found to operate so successfully that little improvement was required. However, in addition to the increased size of the bell itself, one further significant difference was the increase in crew capacity, from 8 berths on the first barge, to 14 on the second, as well as more detailed specifications for the construction of the cabin and accommodation. The two stern cranes on the first barge were reduced to one on the second.

This group of vessels is located opposite the repair and maintenance yard for the Clyde Navigation Trust's dredger plant at Dalmuir, constructed in 1867. These dredger works included a slip for hauling out and a tidal basin; the scale of the dredging fleet and its constant maintenance needs are illustrated by the 200 workers employed there (Riddell 1979, 294). In addition to the remains of the vessels, other features on the riverbank at Newshot include a number of square mooring blocks, exposed at low tide, indicating that this area of the shore was in common use for mooring boats (figure 10). Their presence here, in combination with the location opposite the dredger works suggests that Newshot Island may have been used for mooring parts of the fleet when they were not in use. Furthermore, the Clyde Navigation Trust rented Newshot Island as a disposal site in 1860, the only site they were able to acquire by that time (*ibid.*, 284). This area of the river appears to have been a focal point of activity for the dredging fleet during this period.

However, increasing difficulty acquiring riverbank sites for the disposal of dredged material and the development of new technology in the second half of the 19<sup>th</sup> century led to the development of self-propelled hopper barges, introduced on the Clyde in 1862, which could dump dredged material at sea. Use of this new technique for disposing of spoil rapidly expanded through the next two decades, rendering much of the fleet of mud punts redundant. The rise of hopper barges correlated to a drop in the number of punts in the fleet, declining from 355 at their height in the early 1860s, to

270 in 1871, and 80 by the turn of the century. A small number of them remained in use much later however, with 46 working in 1947, and around a dozen by 1965, employed in carrying stone from quarries, supplies to the dredgers, and partnering the last of the older style of dredgers, (*ibid.*, 284-7).

Development of this new dredging and disposal technology in the late 19<sup>th</sup> century led to major expansion and overhaul of the dredging plant in the first decade of the 20<sup>th</sup> century with almost complete replacement of the fleet as a new generation of dredgers left the older vessels obsolete. This renewal of the dredging plant coincided with a move away from the Dalmuir yard when the site was sold to a shipbuilding company in 1905, with work transferred to a new site at Renfrew in 1908. Newshot Island however, continued in use as a dumping ground where spoil was delivered by the older punts into the 20<sup>th</sup> century, the last location where they were employed in disposal.

The assemblage of dredging plant on the foreshore here reflects the decline of the old disposal techniques and the move away from the Dalmuir yard, and is likely the result of informal and piecemeal abandonment of the older parts of the fleet as they fell out of use, in the location where they were likely regularly moored and where they were employed. The date of 1933 for the breaking up of the diving bell barge indicates that the boat graveyard was still forming up to this date.

## The schooners: results and discussion

The three accessible schooners were recorded in detail and are preserved to varying levels (figures 19-35). The fourth schooner sits in the middle of Newshot Creek and is submerged at low tide (figure 36).

Vessel ID	8														
Visible dimensions (m): Length:	24.6					Breadth: 6.8					Height: 1				
Vessel type:	SCHOONER														
Propulsion:	SAIL														
Construction:	CARVEL														
Visible elements:	PRESENT:	No:	DIMENSIONS:					PRESENT:	No:	DIMENSIONS:					
KEEL :	✓							CROSS BEAM :	X						
KEELSON :	✓							KNEES :	X						
INTERNAL PLANKING :	✓							STEM POST :	X						
EXTERNAL PLANKING :	✓							STERN POST :	✓ (base survives)						
FLOORS :	✓	10 visible						RUDDER :	X						
1ST FUTTOCK :	✓	69 visible						MAST :	X						
2ND FUTTOCK :	✓	32 visible						OTHER ELEMENTS :	Stern gear						
TOP TIMBER :	X								Garboard strakes						
Frame spacing (centre to centre): varies; 0.2-0.3m average, frequently no gaps between frames															
Fastenings: Iron, Copper alloy, trenails															
Toolmarks: None visible															
Description:															
Remains of a wooden schooner, stern end visible on intertidal riverbank, bow end buried in encroaching salt marsh. Hull has been destroyed to level of keel around stern, but survives to 2nd futtock joint amidships. Interior silted up, obscuring internal details presumed to survive buried. Detached section of planking and (?) 2 <sup>nd</sup> futtocks in midships area on port side, seems to have broken from main body of wreck at joint between 1 <sup>st</sup> and 2 <sup>nd</sup> futtock. Appears to have been robustly built, with frames formed of large timbers, often with no gaps between frames, floor timbers appear to be alternating short and long timbers, so joints between floors and first futtocks are offset. Both internal and external planking appears to have originally been double-skinned; the ends of Fe fastenings protrude beyond the surviving layer of planking, with the outer layer removed (potentially salvaged?). Fastenings mostly Fe, but Cu alloy and treenails also noted. Base of stern post survives on keel, part of port side of hull collapsed adjacent to stern, Fe-lined hole c.0.15m diameter on this detached portion of planking.															
Surveyor name:		Dawn Hollis, Allison Gleadhill													
Date of survey:		17/02/2015													

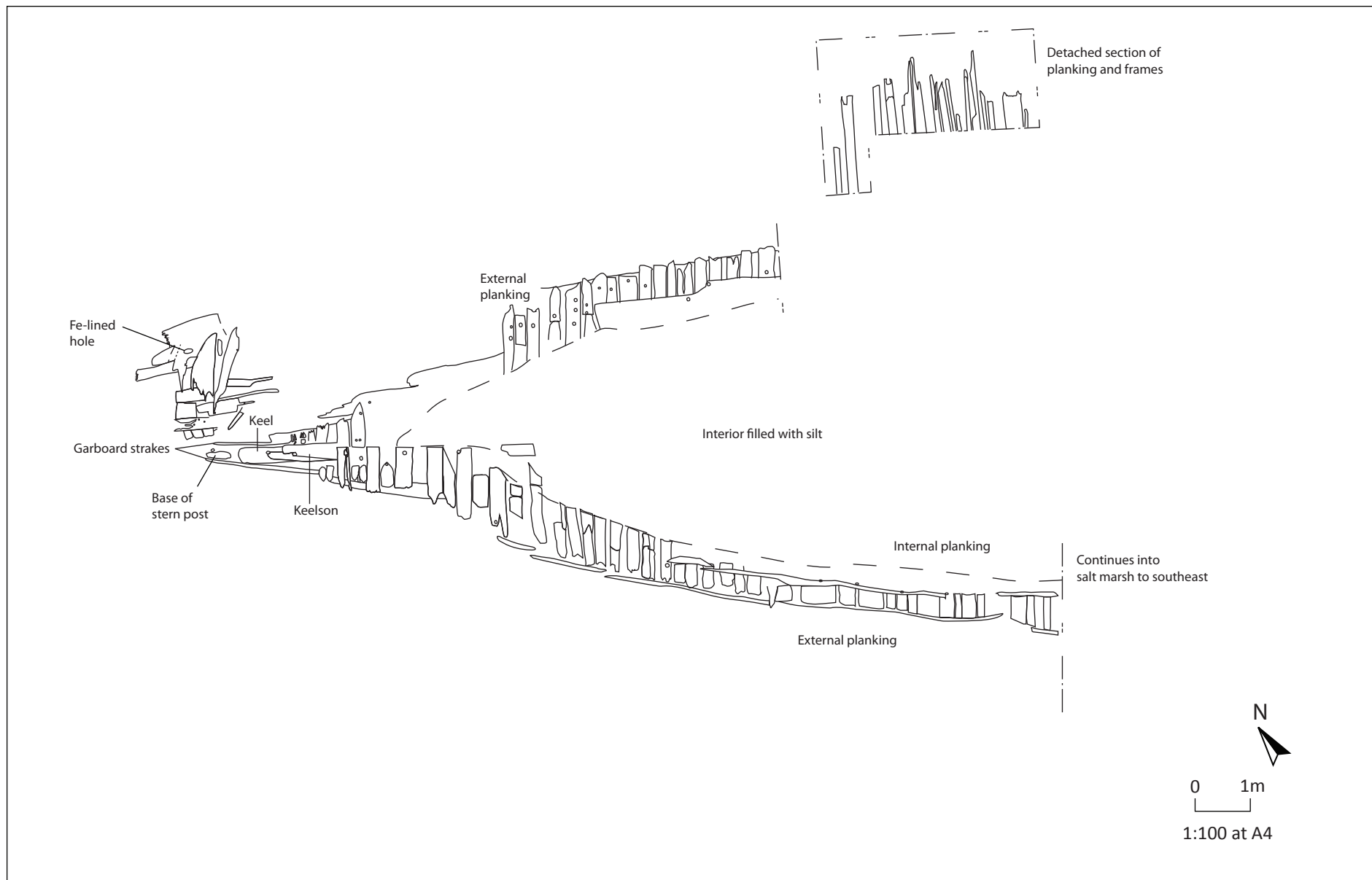


Figure 19: Schooner boat 8. Drawn by Dawn Hollis, Allison Gleadhill, Irene Dayer, Katherine Price, Justine Tarelli, Derek & Pat Wilson, 19th February & 18th June 2017.





*Figure 20: General view of stern end of schooner 8.*



*Figure 21: View of port side of schooner 8, showing detached section of planking and futtocks.*





Figure 22: Detail of detached part of stern end of schooner 8.



Figure 23: Detail of exposed stern end of schooner 8 showing keel, garboard strakes and base of stern post.

Vessel ID	9			Breadth: 7.4	Height: 4
Visible dimensions (m): Length: 26					
Vessel type: SCHOONER					
Propulsion: SAIL					
Construction: CARVEL					
Visible elements:	PRESENT:	No:	DIMENSIONS:	PRESENT:	No: DIMENSIONS:
KEEL :	Presumed buried			CROSS BEAM :	✓ 1
KEELSON :	Presumed buried			KNEES :	✓ 11
INTERNAL PLANKING :	✓			STEM POST :	✓
EXTERNAL PLANKING :	✓			STERN POST :	✓
FLOORS :	Presumed buried			RUDDER :	✓
1ST FUTTOCK :	✓	All		MAST :	?
2ND FUTTOCK :	✓			OTHER ELEMENTS :	Hawse hole
TOP TIMBER :	X				Fe wire rope
Frame spacing (centre to centre): varies; 0.2-0.3m average, occasionally no gaps between frames					
Fastenings: Iron, Copper alloy, trenails					
Toolmarks: None visible					
Description:					
Remains of a wooden schooner, hull survives for its full original length up to the turn of the bilge, wooden part of hull survives to c.1.5m exposed height (lower c.1.5m buried in foreshore sediment) with iron straps / knees attached to the interior of the internal planking, and standing to a further c.1.5m above the wooden structure, indicating the original deck height. The 5 foot draft mark is indicated by lead numerals attached on both sides of stem post. Rudder detached but immediately adjacent to stern post. One timber knee out of situ was noted in interior. Interior filled with silt, but lower elements of hull presumed to survive buried in the sediment. Fe-lined hawse hole at stem end of vessel. Planking patched on port side of hull with scarf joint. Iron sheeting / strapping and gudgeons remain attached to stern post, one with pintle still in situ, broken off from rudder. Possible charring noted on internal planking towards the stern. Upright timber (possible stanchion?) behind stem post, and single crossbeam visible on top of sediment which fills the interior of the hull.					
Surveyor name:	Stephen Stockdale				
Date of survey:	18/02/2015				

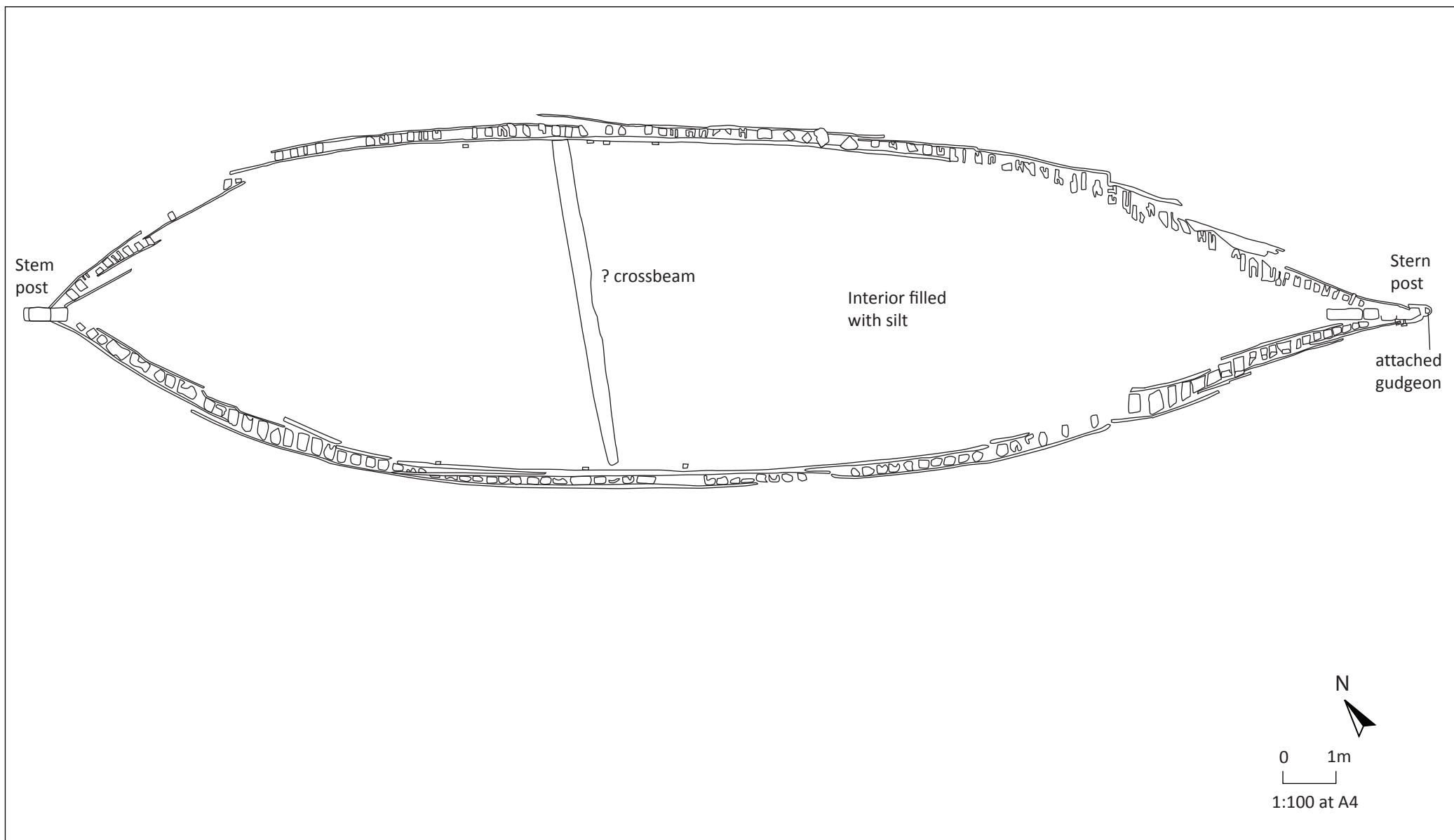


Figure 24: Schooner boat 9. Drawn by Steve Liscoe, Stephen Stockdale & Nick Bulpitt, 19th February 2017.





*Figure 25: General view of schooner 9 from stem, facing south. Iron L-shaped knees indicate deck height.*



*Figure 26: Stem end of schooner 9.*





*Figure 27: Detail of draft mark on stem post of schooner 9 indicated by lead numeral 5.*



*Figure 28: Detail of scarf repair to planking on port side of schooner 9.*





Figure 29: Stern end of schooner 9 showing stern post with gudgeon.



Figure 30: Detail of detached rudder adjacent to stern post of schooner 9.



Vessel ID	10					
Visible dimensions (m): Length:	13.5			Breadth:	5.7	
Vessel type:	SCHOONER			Height:	1.3	
Propulsion:	SAIL					
Construction:	CARVEL					
Visible elements:	PRESENT:	No:	DIMENSIONS:	PRESENT:	No:	DIMENSIONS:
KEEL :	Presumed buried			CROSS BEAM :	X	
KEELSON :	Presumed buried			KNEES :	X	
INTERNAL PLANKING :	✓	3 rows	2.9m min x 0.15-0.24m x 0.04-0.05m	STEM POST :	✓	1.25m high x 0.16-0.22 x 0.26m
EXTERNAL PLANKING :	✓	7 rows	1.2m min. x 0.16-0.2m x 0.04-0.05m	STERN POST :		
FLOORS :	Presumed buried			RUDDER :		
1ST FUTTOCK :	✓	76	0.13 x 0.17	MAST :		
2ND FUTTOCK :	X			OTHER ELEMENTS :	Post in front of stern post	0.1-0.15m x 0.12-0.18m x 0.8m visible height
TOP TIMBER :	X					
Frame spacing (centre to centre): 0.18-0.2m						
Fastenings: Iron, trenails						
Toolmarks: X on heads of trenails						
Description:						
Remains of a wooden schooner, hull survives to 1.3m height at stem post, stern buried by developing salt marsh. Interior filled with sediment, and lower c.1m of hull buried in foreshore mud, leaving lower part of stem post, interior and exterior planking and ends of frames visible, 35 visible to port side, 41 on starboard. Frames appear to have been constructed in pairs with gaps between each pair. Upper part of bow consisting of stem post and attached pieces of planking with iron-lined hawse hole has broken from main body of hull and lies short distance in front of vessel, partly submerged at normal low tides. Draft marks in Roman numerals IV and V visible carved into port side of stem post, IV visible on starboard side. Stem deadwood attached to stem post by threaded iron bolt; square profile iron bolts attach deadwood to stem post and external planking, and attach frames to inner and outer planking. External planks fastened by trenails at regular intervals. Iron chain lies 3.7m from bow on port side.						
Surveyor name:	Katherine Price, Alexandra Deamer-John, Kelsey Jackson-Williams					
Date of survey:	18/02/2015					

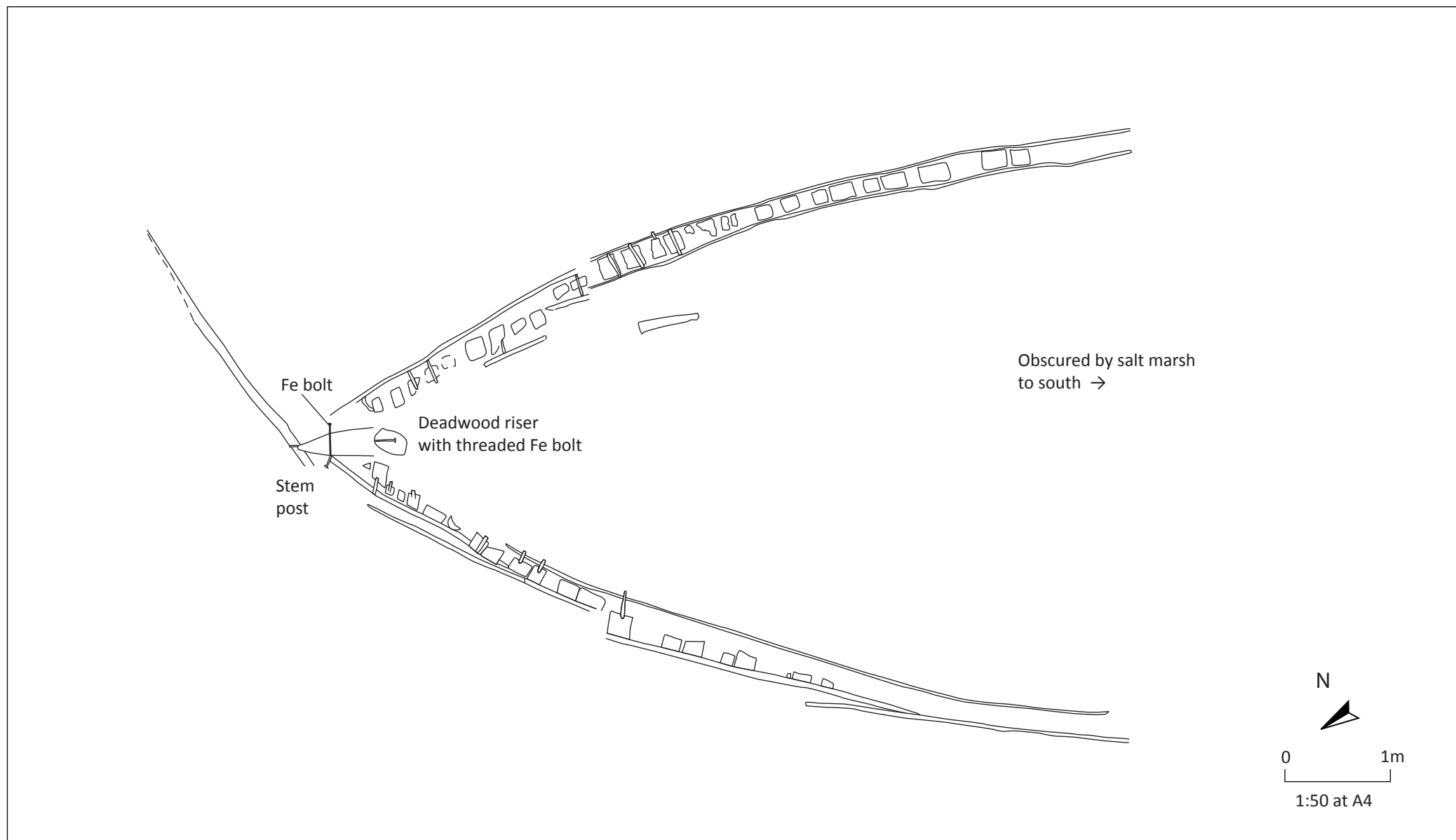


Figure 31: Schooner boat 10. Drawn by Joanna Hambly, Alexandra Deamer-John, Katherine Price & Kelsey Jackson-Williams, 19th February 2017.



*Figure 32: Working shot and general view of schooner 10.*



*Figure 33: Detached portion of stem of schooner 10, the iron-lined hawsehole is just below the water.*



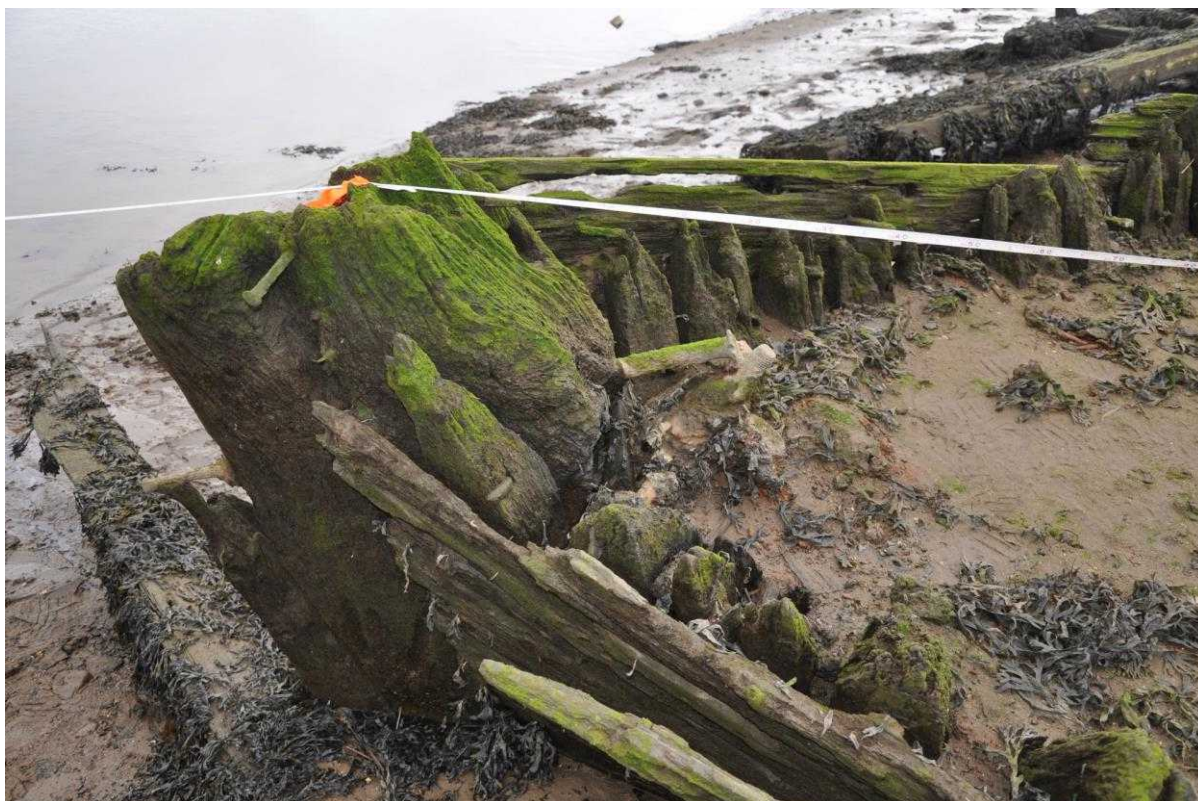


Figure 34: Detail of interior of stem post and deadwood riser, schooner 10.

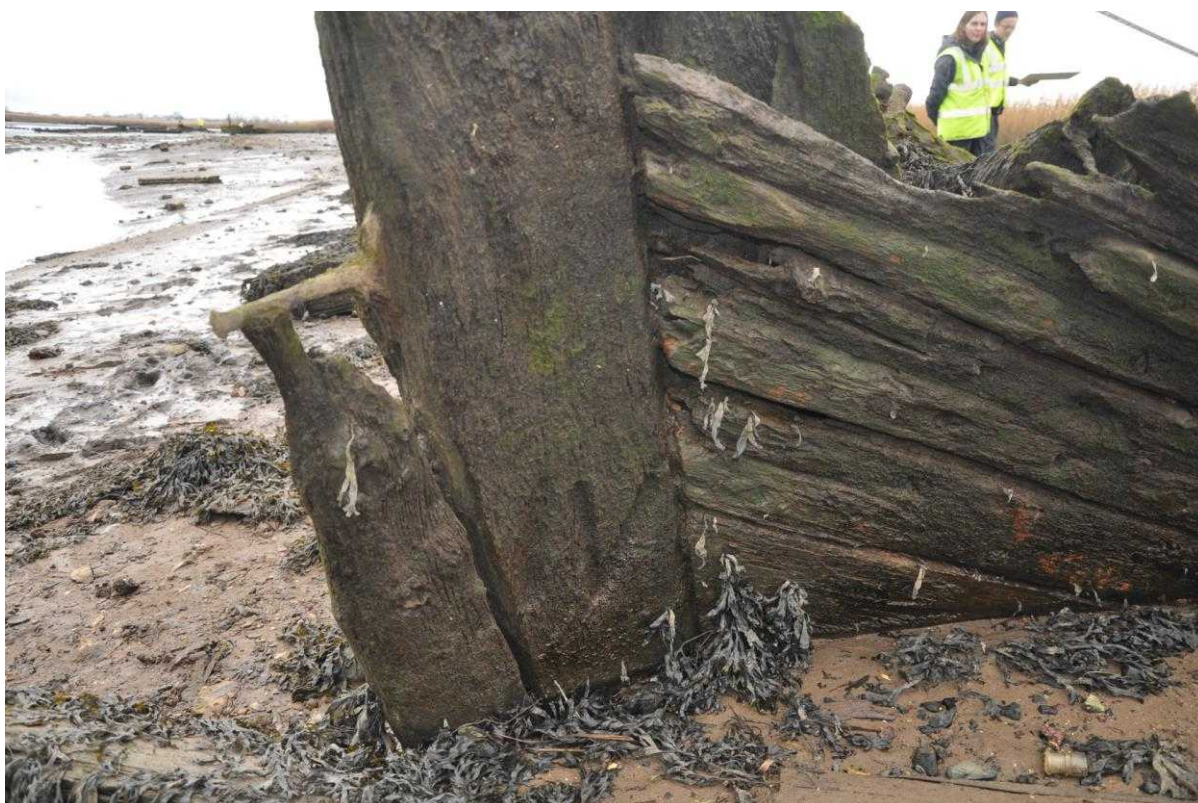


Figure 35: Detail of stem post of schooner 10 with incised Roman numeral draft mark IV.





*Figure 36: Fourth schooner 11 remains mostly submerged at low tide.*

These three wooden vessels and the details of their construction recorded by this survey appear to correspond to their identification as late 19<sup>th</sup> century schooners of the sort which were engaged in the coastal trade and around the Firth of Clyde in the early 20<sup>th</sup> century. Although the location of the fourth boat in the channel prevents detailed examination, it appears to be of broadly similar type. None of the three vessels which have been examined in detail have yet been positively identified; given their condition and the extent of the damage they have suffered, it's possible that no definitive identification is possible.

These four wooden schooners appear to have been deliberately abandoned here at Newshot Island. Some possible evidence of fire damage was noted on the planking towards the stern of boat 9. Although this assemblage of boats can't be conclusively linked to the 1914 fire at the Kingston Docks, the deliberate abandonment of a group of four vessels is unusual enough to suggest a link between this boat graveyard and the fire, and that these vessels are very likely to be the four schooners which were reported destroyed. This surmise is further supported by a contemporary photograph of the destruction at the dock following the fire (figure 11), which shows a burnt wooden vessel in the foreground, which is similar in appearance to the surviving hulk of boat 9. The boats were described as having been burnt to the water's edge (Western Mail, 19<sup>th</sup> June 1914), the lower parts of the hulls are all that remains of the vessels at Newshot; though due to the deterioration of the remains over the intervening 100 years, it is impossible to disentangle the destruction of the fire (and probable journalistic hyperbole) and the from the natural processes of decay to wooden structures in the intertidal zone.

However, occasional specific constructional details have been noted, such as the different styles of the draft marks on the stems on boats 9 and 10, the iron straps on the interior of boat 9 and the double skin planking on boat 8. If the original specifications for the four vessels which were destroyed by the fire survive and contain sufficient detail, examination of these records may enable them to be related to the remains on site.

The fire at the Kingston Dock occurred at a turning point in the development of shipping around Britain and the Clyde estuary. Through the early years of the 20<sup>th</sup> century, schooners, out-competed by bigger and faster motorised boats, were increasingly working on the home trade and as coasters. Diesel engines were introduced prior to 1914, but the First World War acted as the major catalyst for change, and after this few sailing schooners continued in use. The destruction of four schooners in the fire happened at a time when these vessels were in decline around the coast; after the war sailing boats were predominantly replaced by motor power. This collection of wooden sailing boats are likely to survive in this boat graveyard because of their deliberate abandonment here following the fire.

If the potential connection between the 1914 fire and these vessels is accepted, it would date the dumping of the burnt boats to a period when this boat graveyard at Newshot Island was already in use, after the dredger works had moved from the yard at Dalmuir, and with the increasing redundancy of much of the fleet of mud punts. If this were the case, this site may have been specifically selected for the disposal of the burnt schooners alongside other abandoned vessels, on the Newshot Creek, out of the main shipping channel of the Clyde. It suggests that this boat graveyard may have developed through a variety of processes of informal dumping due to obsolescence and deliberate abandonment.



## Publication

The results of this work will be submitted for publication to the International Journal of Nautical Archaeology, and will be included as a case study in a forthcoming edition of the Archaeological Review from Cambridge. It will feature in an episode of Channel 4's *Britain at Low Tide* due to air in late 2017.

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